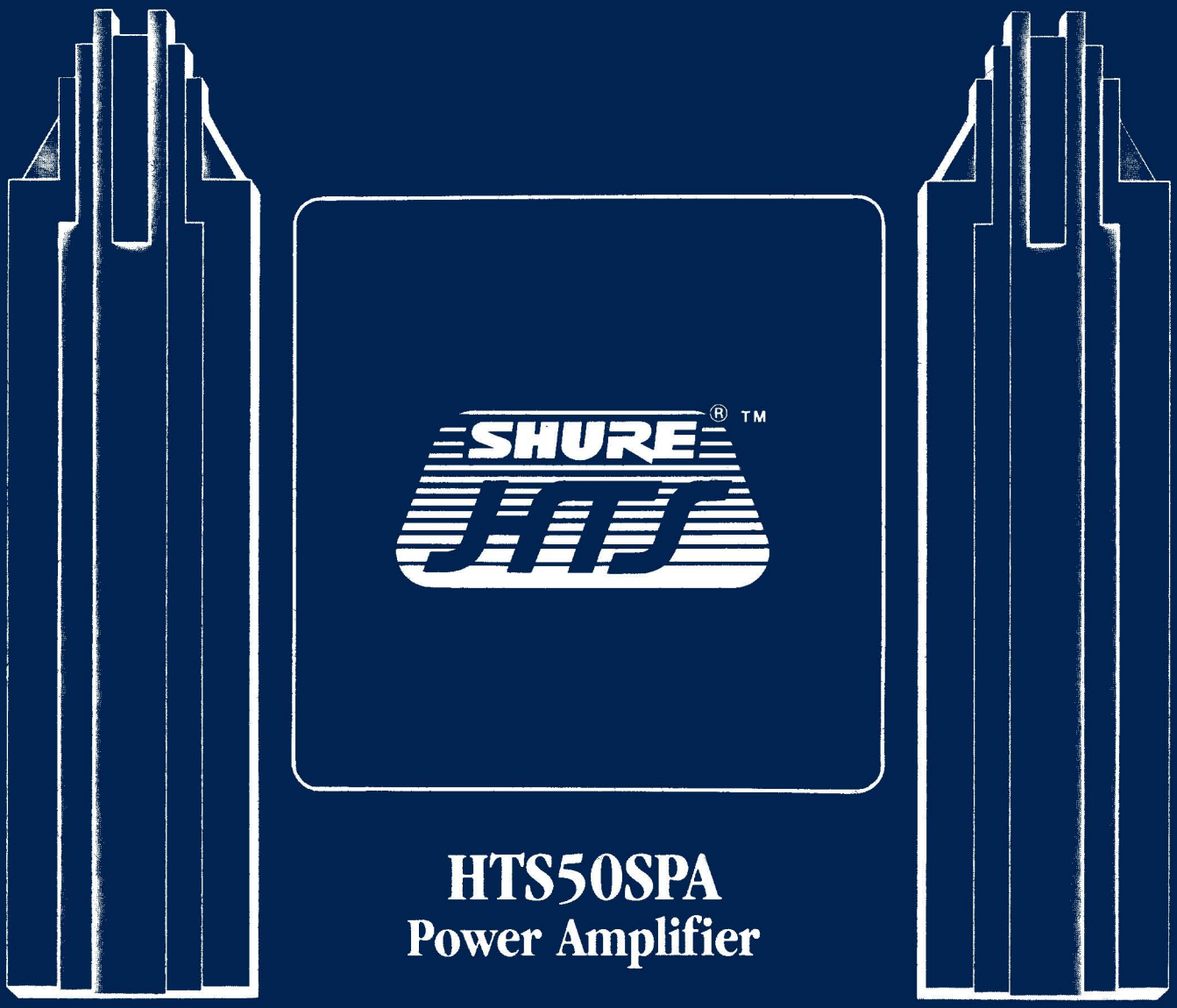
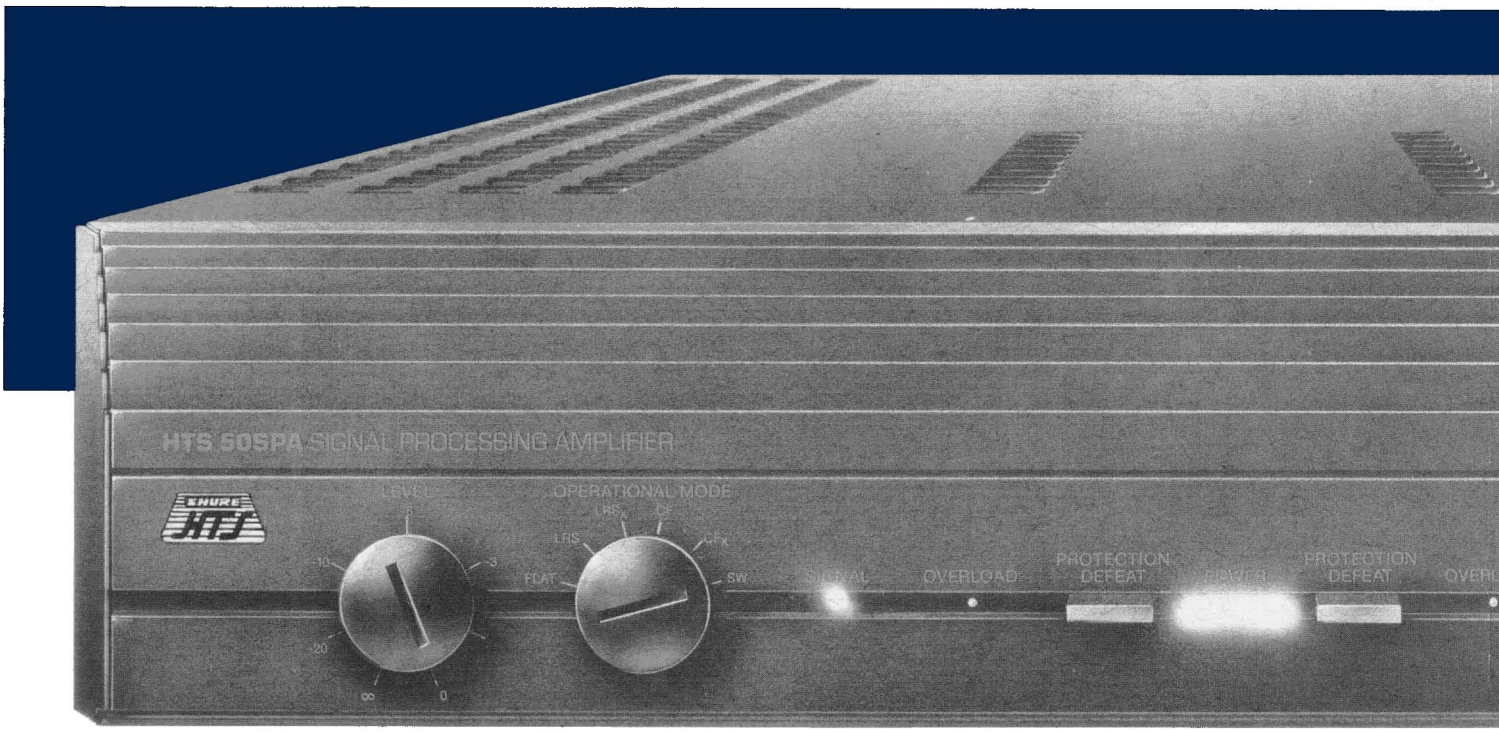


HTS50SPA
Power Amplifier

HTS50SPA SIGNAL PROCESSING STEREO POWER AMPLIFIER



INTRODUCTION

Congratulations! You have chosen the Shure HTS50SPA Signal Processing Stereo Power Amplifier, specially made as an integral part of your Shure HTS Theater Reference System. The other elements of the Shure HTS Reference system are the HTS5300 Acra-Vector* Logic Decoder, HTS50CF Center Front Loudspeaker, HTS50LRS Front and Surround Loudspeakers, and HTS50SW Subwoofer Loudspeaker. These products of Shure's Home Theater Sound Division re-create in your home the same realism and immediacy you hear in the very best motion picture theaters and production dubbing stages.

The Shure HTS5300 Acra-Vector Decoder is the main control center for your Home Theater System; the HTS5300 employs the latest exclusive Shure-patented techniques in analog and digital signal processing electronics.

See the System Manual included with your HTS Decoder for complete system installation, connection and operation information.

Theory of Operation

The HTS50SPA amplifier precisely matches both the Shure HTS Decoder and Shure HTS Loudspeakers. The output response of the HTS50SPA is tailored to correspond to the particular Shure HTS loudspeaker system selected in each of its HTS-speaker-correlated switch-selectable Operational Modes. Through extensive laboratory testing and many hours of program listening the Shure HTS Division has achieved an optimum correlation between the program material and sound delivered to the room. As the program signal is traced through the HTS50SPA to the output connectors, it is corrected for the loudspeaker-crossover interaction, loudspeaker-to-room transfer function and program-material dependence whether the program is cinema or conventional music audio. Multiple circuit functions combine to control the presentation of an accurate soundfield at the listener positions in a room. Such attention to detail is present in only the finest audio systems, and the Shure HTS Theater Reference System sets the new standard.

Consequently, the HTS50SPA offers the user an amplifier that is outstanding for highest quality home theater audio-video presentations as well as one that provides unique signal control in conventional multi-channel audio only listening.

The LRS_X and CF_X extended low-frequency Operational Modes are intended for use respectively with the HTS50LRS and HTS50CF Loudspeakers when the HTS system **does not** include a subwoofer. In these two Modes, amplifier low-frequency output is extended to help compensate for the lack of a subwoofer.

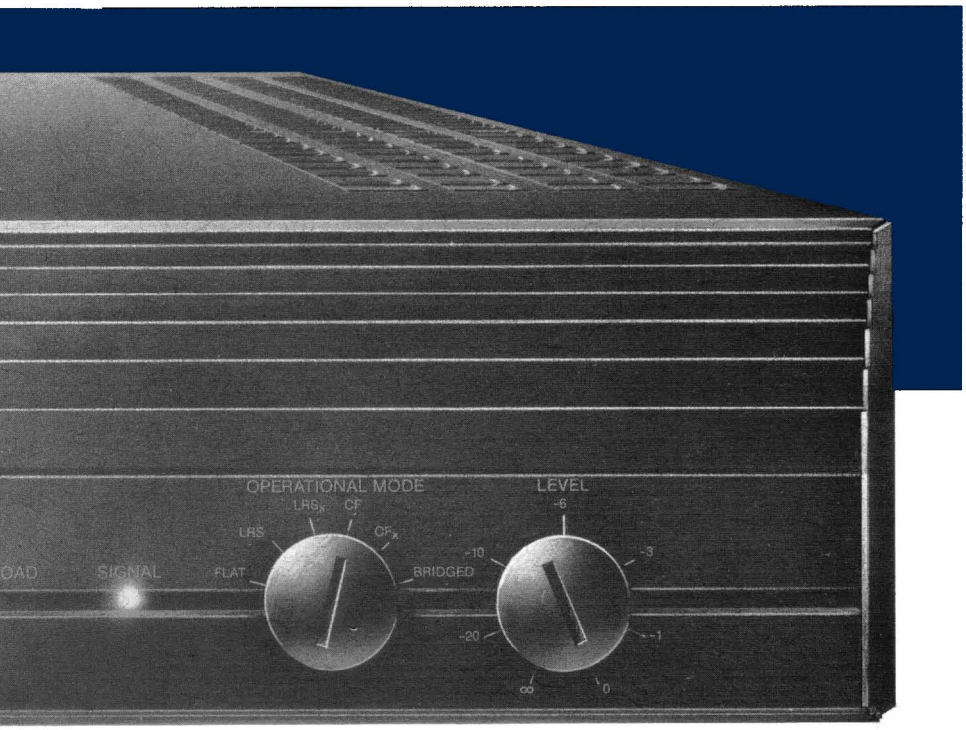
The LRS and CF modes are also intended for use with the HTS50LRS and HTS50CF loudspeakers, but in a system that **does** include the HTS50SW Subwoofer. In these two Modes, amplifier low frequency output cuts off at 80 Hz to complement the frequency range of the HTS50SW Subwoofer.

When Channel 1 is in Operational Mode SW, amplifier output extends from 33 to 80 Hz to match the frequency response of the HTS50SW Subwoofer.

To further enhance its versatility, each channel of the HTS50SPA amplifier also includes a "Flat" output mode, making it suitable for use with any loudspeaker.

An excursion limiting circuit in the HTS50SPA continuously monitors the audio signal. This circuitry modifies the low-frequency response only when necessary to prevent overexcursion of the loudspeaker connected to that channel. The characteristics of this circuitry depend on the Operational Mode selected since each Mode is correlated to the HTS Loudspeaker

*U.S. Patent 4,696,036



CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER
NO USER-SERVICEABLE PARTS INSIDE
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral trangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

attached at the output terminals.

In addition, the amplifier features a clipping protection circuit. This circuit does not add distortion to the signal, as do ordinary "soft clipping" circuits. Instead, it reduces the gain of the amplifier only when necessary to avoid long term hard clipping. This circuit can be selectively disabled by pressing the Protection Defeat switch for each channel desired.

The slotted control knobs on the HTS50SPA are intended to require insertion of a coin to change their settings. These knobs resist accidental changes of position.

Two LED's on the front panel illuminate to indicate the presence of an audio signal, and either operation of the protection circuit or clipping. Power on is indicated by the illuminated power button.

Amplifier Architecture

To interface with the outside world, the amplifier input connectors are gold-plated RCA type phono jacks; output connectors are gold-plated five-way binding posts suitable for use with most high-performance audio cables.

To receive and generate signals at the input and output connectors respectively, scrupulous care has been exercised in design and construction of the HTS50SPA with highest quality components used throughout. The power amplifier circuit of each channel uses a hybrid audio power module construction. This compact assembly technique combines semiconductor chips, normally used in amplifiers as separate discrete devices, into a tightly coupled unit on a multilayer high-thermal-conductivity substrate. The high thermal conductivity of the base substrate results in a close thermal match of the amplifier output circuits to the voltage and current gain driver stages. Each discrete device now tracks the other dependent on power dissipation in the output stage. This is not possible with the discrete separated parts using normal amplifier construction. Thus the HTS50SPA takes advantage of one of the benefits of monolithic integrated circuits while still retaining a discrete component topology as part of the hybrid amplifier module. The total amplifier circuit combines the hybrid module and special control circuitry to deliver high current and voltage with low distortion and precise control of the amplifier circuit in overload conditions. The output amplifiers in each channel are complemented by signal processing circuits which match amplifier operation to the HTS loudspeakers. The total combines low noise FET operational amplifiers, high quality small signal capacitors and resistors, multiple computer grade power supply capacitors, glass epoxy circuit boards, and a high current low noise, instrumentation grade toroidal power transformer.

The result of these circuitry techniques is an amplifier of exacting specifications, precisely processing the input signal and accurately matching HTS50 Series Loudspeakers to produce many years of enjoyment of the finest film and music sound stages.

HTS50SPA FRONT PANEL CONTROLS

(A) **LEVEL:** For both Channel 1 and Channel 2, the normal position for the Level control is 0 (no attenuation for all loudspeakers.) In the HTS Theater Reference System, total Volume level and Surround level are controlled at the HTS Decoder or its Remote Control.

In certain cases, other level settings can also be recommended.

1. To compensate for room variations, see the Balance and Phasing section of the HTS5300 Manual for specific instructions.

2. For a more visceral low end in theatrical presentations, either turn all level controls to -3 except for the HTS50SW Subwoofer or turn all levels controls to -6 except for the Subwoofer. In both setups, leave the Subwoofer channel level control at 0. The additional ultra-low-frequency

emphasis in either alternate level setting can provide exceptional excitement and even greater enjoyment in home theater sound.

These slotted control knobs are intended to require insertion of a coin to change their settings; they resist accidental changes of position.

(B) OPERATIONAL MODE: The Operational Mode switches select the signal processing characteristics of each amplifier channel independently to complement the response characteristics and excursion limits of the HTS Loudspeakers: HTS50CF Center Front, HTS50LRS Front Left, Right and Surround, or HTS50SW Subwoofer (selectable in Channel 1 only). These slotted control knobs are also intended to require insertion of a coin to change their settings; they resist accidental changes of position.

An excursion limiting circuit continuously monitors the audio signal, and modifies the low-frequency response only when necessary to prevent over-excursion of the particular HTS loudspeaker connected to that channel. The characteristics of this circuitry depend on the Operational Mode selected. This limiter circuit is always active for loudspeaker protection.

There are two possible Operational Modes for the CF and LRS Loudspeakers, selected according to whether or not a subwoofer is used in the Home Theater Sound System. When the selector is in the CF or LRS position, the amplifier low frequency output cuts off at 80 Hz to match the HTS50SW Subwoofer response; these Operational Modes should be selected when the HTS system does include the HTS50SW subwoofer.

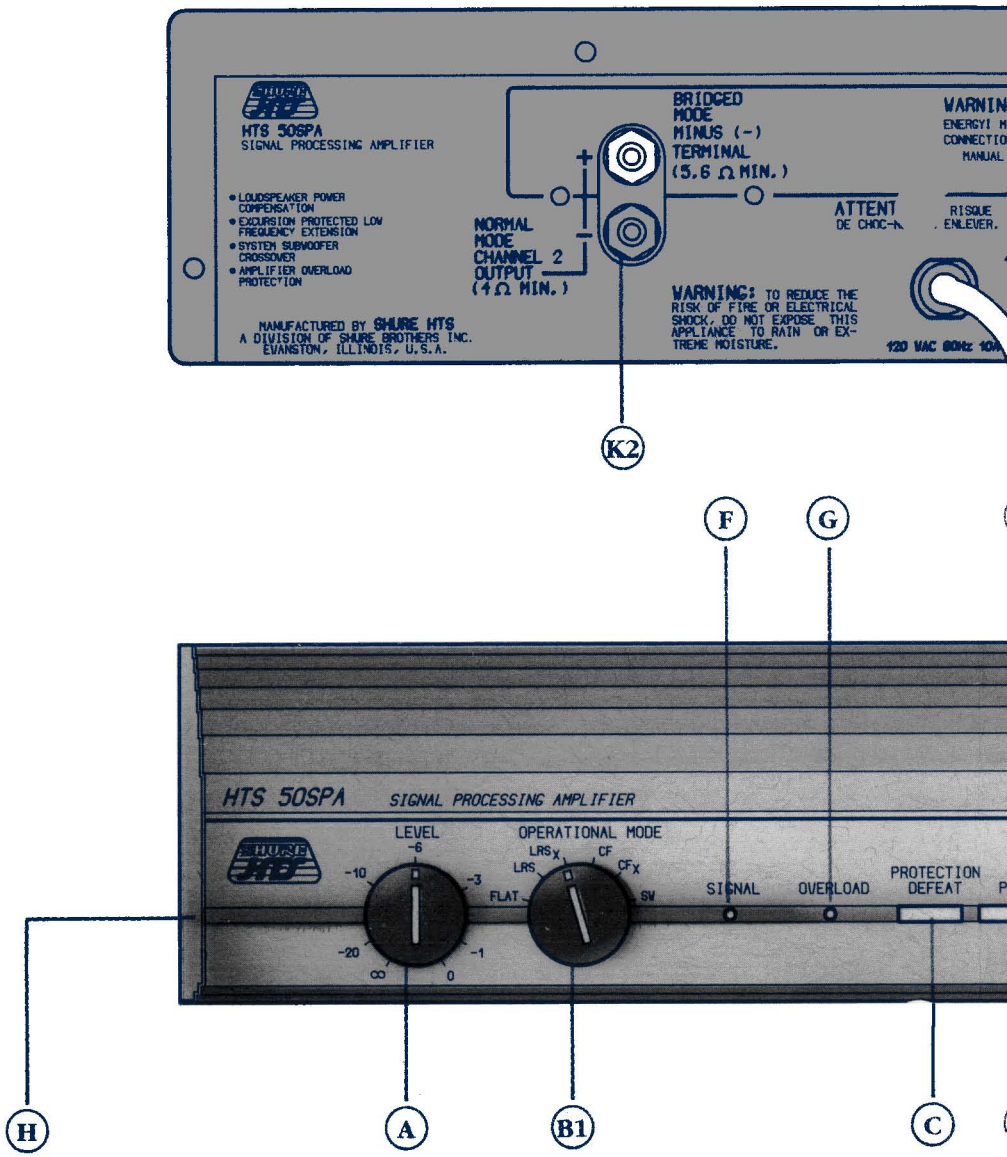
When the system does not include the subwoofer, the selector should be in the CF_X or LRS_X Mode. In these Modes, the amplifier low frequency output extends down to 60 Hz: the extended low-frequency output signal is intended to help compensate for the lack of a subwoofer.

(1) CHANNEL 1

FLAT: Output has no signal processing in the signal path other than the defeatable clipping protection circuit. In Flat Mode the HTS50SPA is suitable for use with any loudspeaker.

LRS: Output is tailored to match the HTS50LRS Loudspeaker with low-frequency cutoff at 80 Hz for use in a system that **does** include a subwoofer.

LRS_X: Output matches HTS50LRS Loudspeaker with low-frequency extension down to 60 Hz for use in a system that does not include a subwoofer.



CF: Output matches HTS0CF Loudspeaker with low-frequency cutoff at 80 Hz for use in a system that **does** include a subwoofer.

CF_X: Output matches HTS50CF Loudspeaker with low-frequency extension down to 55 Hz for use in a system that does not include a subwoofer.

SW: Output matches HTS50SW Subwoofer with controlled low-frequency boost and response from 33 to 80 Hz. *This Mode is available only on Channel 1.*

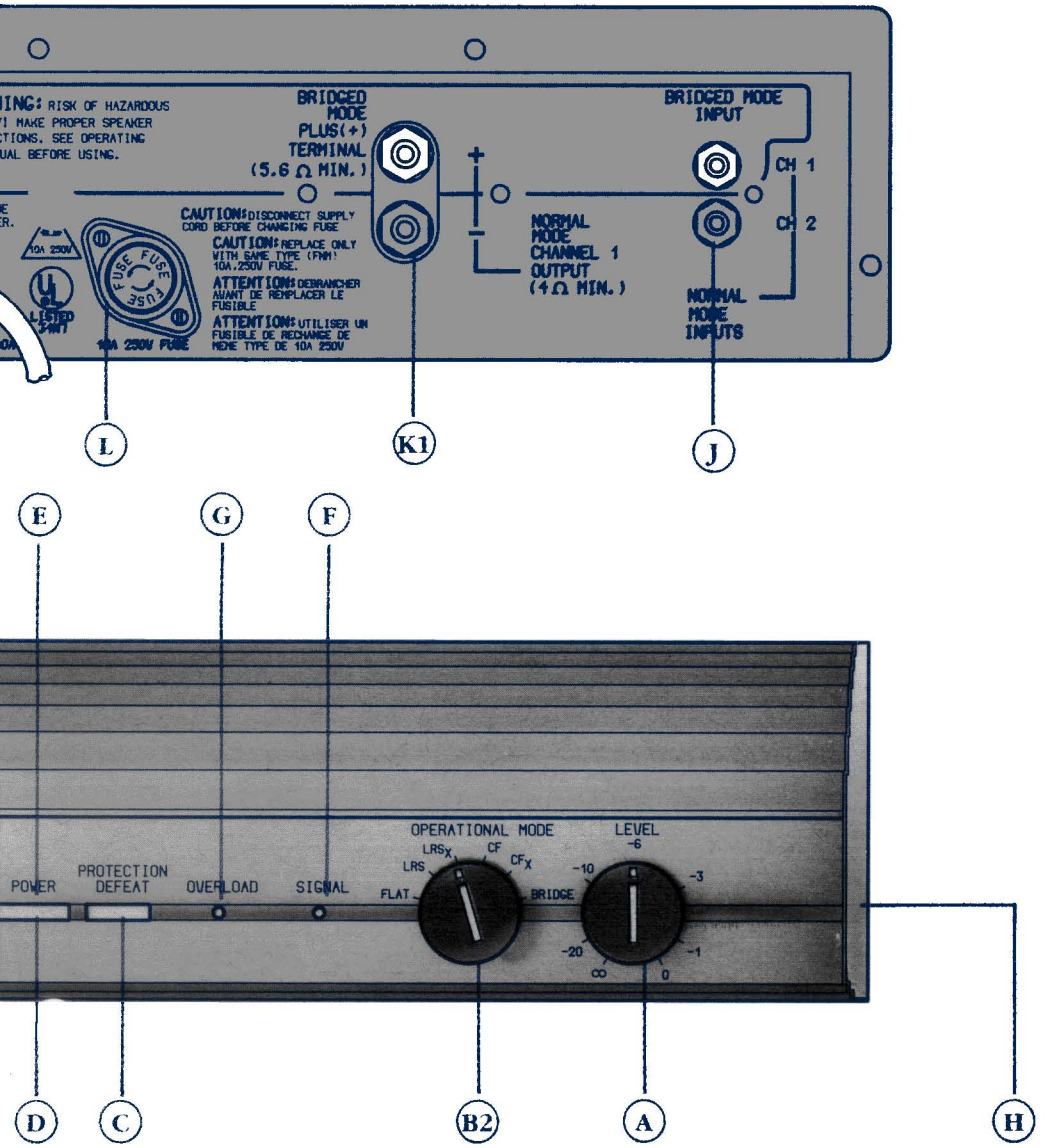
(2) CHANNEL 2

Identical to Channel 1 except the extreme clockwise position in Channel 2 is Bridge instead of SW. Explanation follows.

BRIDGE: Input from Channel 1 appears at both Channel 1 and Channel 2 plus (+) outputs (Channel 2 Input does not function when Mode Selector is in Bridge.) Use the Operational Mode selector of Channel 1 set to any appropriate position to control equalization of the output to match HTS50 Loudspeakers or set to Flat for any other loudspeaker; use the Channel 1 Level control to determine the Bridged output level. In Bridged Mode, the protection circuitry for both channels should have the same status (Protection Defeat pushbuttons **both** out or **both** in). Total output is 250 watts into 8 ohms from 1 volt input. Refer to Bridge Connection instructions for specific details on connecting loudspeakers for this Operational Mode.

(C) PROTECTION DEFEAT: Individual pushbutton switches for Channel 1 and Channel 2 disengage the built-in protection circuitry that prevents long-term hard clipping at the output. Under most ordinary circumstances, the protection circuits should be engaged (Protection Defeat switch out.)

(D) POWER: The pushbutton switch turns power on and off.



INDICATORS

(E) POWER: Red light in the pushbutton Power switch illuminates to indicate power is on.

(F) SIGNAL: Green light illuminates when a signal is present in the channel.

(G) OVERLOAD: Red light illuminates to indicate limiting when the Protection Defeat switch is **out**, or to indicate clipping when the Protection Defeat switch is pushed **in**. In normal use with HTS50 loudspeakers, the overload light will turn on occasionally for high-level dialogue or music peaks.

(H) INDICATOR TABS AND SLOTS: Snap the supplied Indicator Tabs into these slots when the loudspeaker is connected to the amplifier. The tabs show the speaker location corresponding to each channel (LEFT, RIGHT, CENTER, SURROUND LEFT, SURROUND RIGHT, SUBWOOFER OR BRIDGED.)

If speaker locations are reassigned, remove the tabs by carefully prying one corner out of the slot with a pointed instrument. The tab can then be removed with the fingertips. Take care not to scratch or damage the amplifier front finish when removing the indicator tab.

BACK PANEL

(J) INPUT CONNECTORS: Channel 1 and Channel 2 input connectors are heavy-duty gold-plated phono (RCA type) jacks. **Use only Channel 1 input when BRIDGED MODE output is selected.**

(K) OUTPUT CONNECTORS: All output connectors are five-way gold-plated binding posts that will accept any of the following methods of connection: bare wire wrapped around the post, bare wire inserted through the hole in the post, spade lug around the post, pin connector through the hole in the post, or banana plug inserted in the jack. These output connectors will accommodate most high-performance audio cables. (Gold .080-inch diameter pins soldered to the loudspeaker cables and inserted under the binding post hex caps [fastened finger-tight] are the most reliable connection.) To maintain proper speaker polarity in the completed HTS system, it is **extremely** important that each plus (+) amplifier output terminal is connected only to a plus speaker terminal, and each minus (-) amplifier output terminal is connected only to a minus speaker terminal.

(1) CHANNEL 1 OUTPUT: Both plus and minus terminals are used in normal two-channel operation to drive an HTS50CF, HTS50LRS, HTS50SW or any other loudspeaker. Only the plus terminal of Channel 1 is used as the plus or high side output connection to a loudspeaker when the HTS50SPA is in the BRIDGED MODE*.

(2) CHANNEL 2 OUTPUT: Both plus and minus terminals are used in normal two-channel operation to drive an HTS50CF, HTS50LRS, HTS50SW or any other loudspeaker. Only the plus terminal of Channel 2 is used as the minus or low side output connection to a loudspeaker when the HTS50SPA is in the BRIDGED MODE*.

(L) EXTERNAL FUSE: The 10A, 250 V Slo-Blo fuse accessible from the rear panel is user replaceable. If the fuse should blow, disconnect the power cord, and remove the fuseholder and fuse by pressing inward and rotating counterclockwise. Replace the fuse only with one of the same type, same amperage and voltage rating.

If the fuse should blow a second time, do not replace it again. Contact the Shure Service Department or other qualified service personnel to correct the problem.

*See Bridged Connection instructions.

BRIDGED CONNECTION

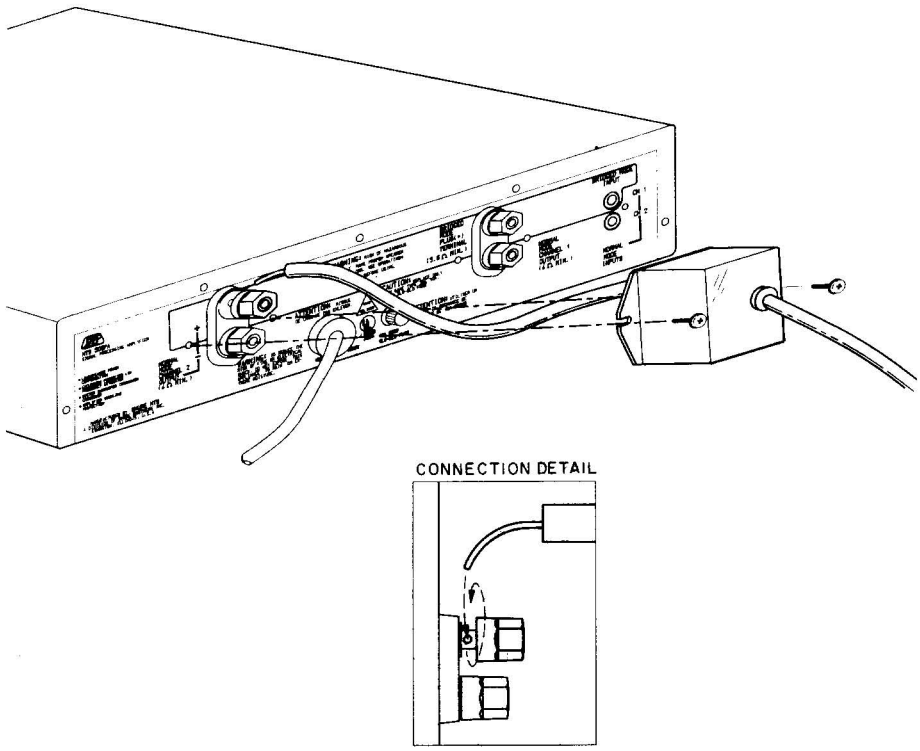
If the amplifier is used in the Bridged Mode, to prevent the risk of electric shock the following instructions describe the only acceptable method of connection (see illustration).

WARNING

Voltages in the Bridged Connection are hazardous to life. Make all amplifier-to-speaker connections with AC power disconnected. Refer servicing to qualified service personnel.

1. Thread the speaker lead through the hole in the supplied connector cover plate.
2. Loosen the insulated red locking cap on the binding post, strip the end of the speaker lead (approximately 19 mm [3/4 in.]), and insert the stripped wire into the hole in the binding post. Twist the stripped wire around the post and tighten the locking cap.
3. Attach the cover plate over the binding post terminal and fasten it with the supplied screws.

NOTE: To ensure correct Bridged Mode speaker polarity, connect the plus (+) terminal of Channel 1 only to the plus speaker terminal and connect the plus terminal of Channel 2 only to the minus (-) speaker terminal.



BRIDGED CONNECTION

SPECIFICATIONS

Frequency Response (Flat Mode*)
20 Hz to 20 kHz ± 0.5 dB

Power Output
100 watts minimum per channel into 8 ohms with less than 0.1% THD

Input Impedance
100 kilohms

Recommended Minimum Output Load Impedance
4 ohms

Input Sensitivity (Full Power Output in Flat Mode*)
0 dBV (1.0 V)

Dynamic Range
Greater than 100 dB from noise level to clipping (300 Hz to 20 kHz)

Power Requirements
120 Vac ± 10%, 60 Hz

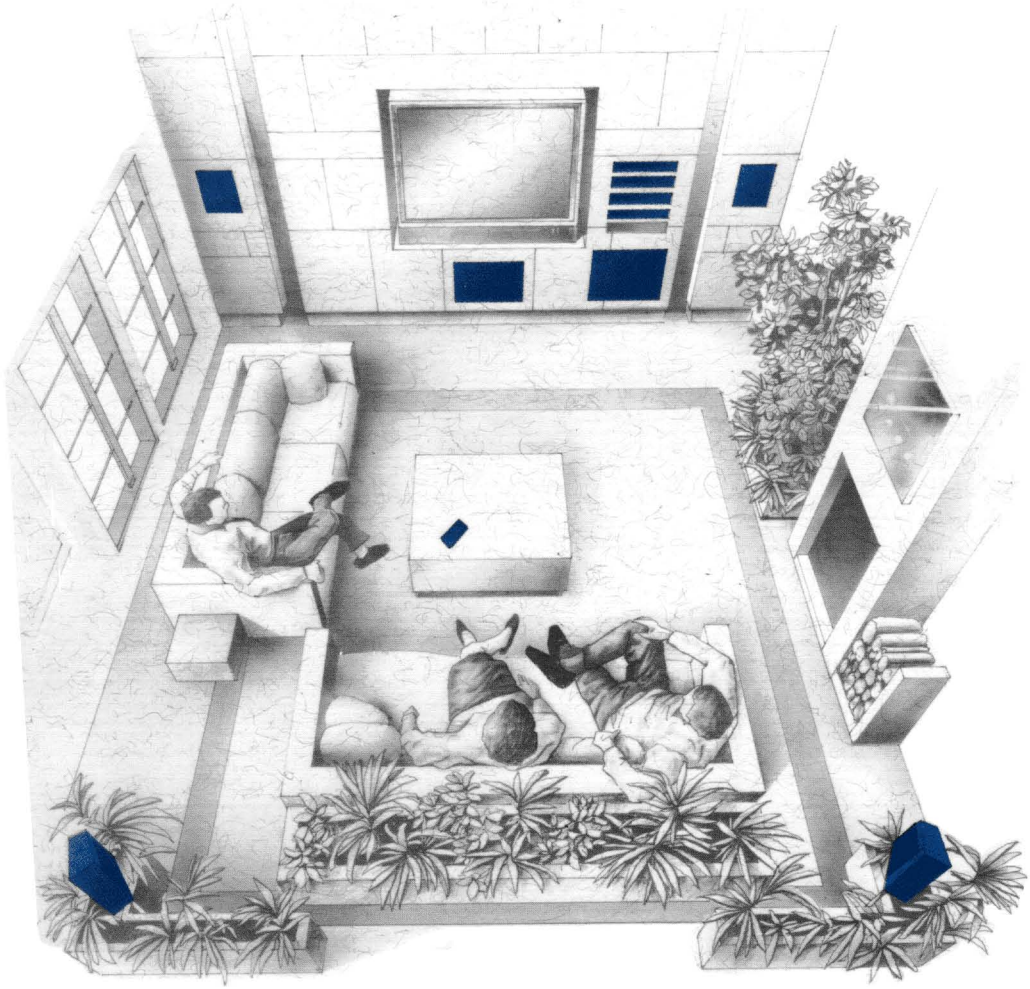
Certifications
Listed by Underwriters Laboratories Inc.

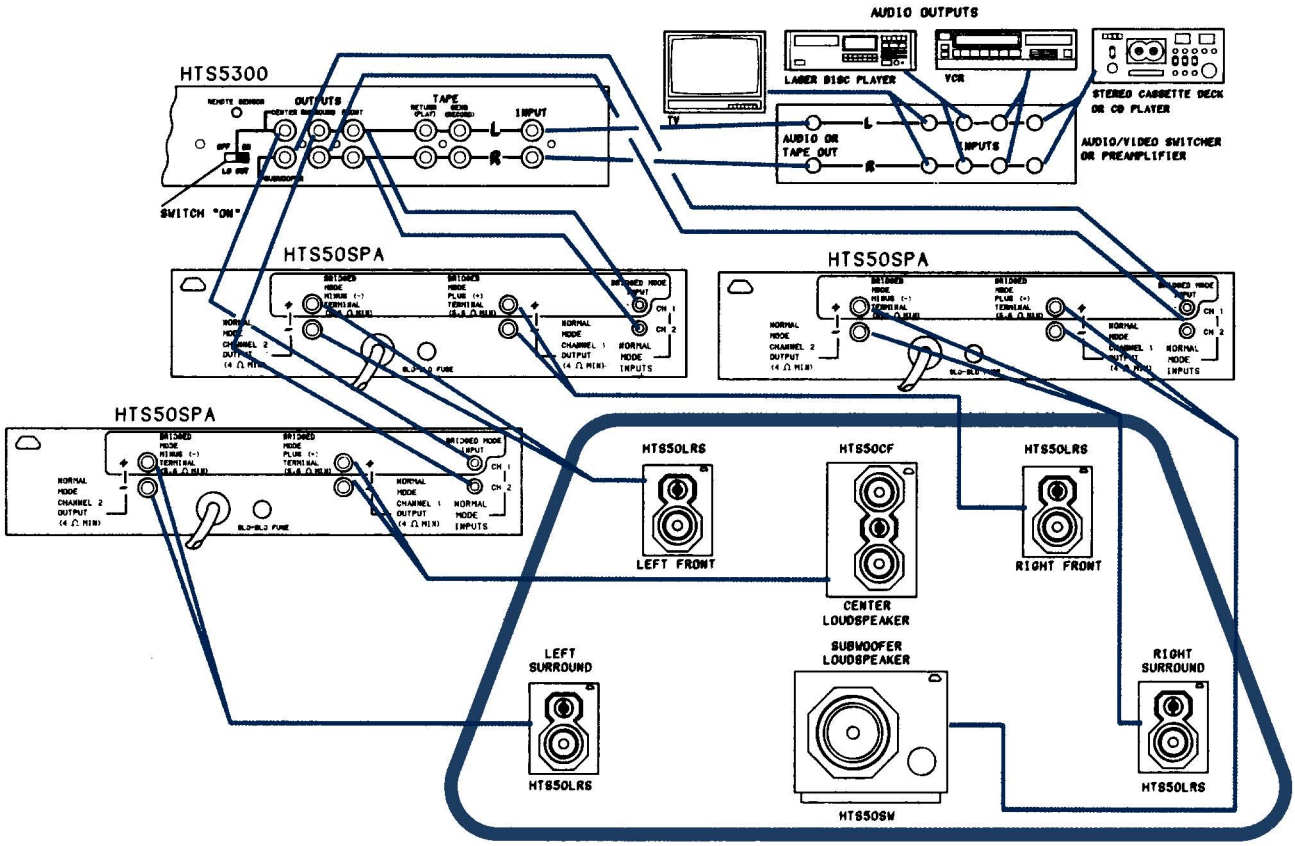
Overall Dimensions
102 mm H × 429 mm W × 356 mm D (4 × 16⅞ × 14 in.)

Weight
12.3 kg (27 lb)

*In other modes Frequency Response and Sensitivity are tailored to complement the individual HTS Loudspeakers' Frequency Response and Sensitivity

TYPICAL SYSTEM ARRANGEMENT





TYPICAL SYSTEM CONNECTIONS

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